671-P

Cheri Sawyer

From: Bhol, Saroj [sbhol@panynj.gov]
Sent: Wednesday, February 18, 2004 11:16 AM
To: 'Shyam Sunder'
Cc: W. Stuart Dols; dave Evans; cauffman@nist.gov; cheri.sawyer@nist.gov; john.eichner@nist.gov; Begley, James; Buchsbaum, Jack; Fadavi, Ali; Hamann, William; Lin, C. John; Lombardi, Frank; Pal, Dharam; Reiss, Alan; York, Anthony
Subject: RE: Smoke Management Sys Questions for PANYNJ

HughesQu
02_10_20(

Shyam,
Please see the attachment for response.
Thanks
Saroj

-----Original Message-----
From: Shyam Sunder [mailto:sunder@nist.gov]
Sent: Tuesday, February 10, 2004 11:03 AM
To: Bhol, Saroj
Cc: W. Stuart Dols; dave Evans; cauffman@nist.gov; cheri.sawyer@nist.gov; john.eichner@nist.gov
Subject: Fwd: Smoke Management Sys Questions for PANYNJ

Saroj,

Could you please respond to the following information request? Thanks.

Shyam
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Date: Tue, 10 Feb 2004 10:55:48 -0500
To: sunder@nist.gov
From: "W. Stuart Dols" <wsdols@nist.gov>
Subject: Smoke Management Sys Questions for PANYNJ
Cc: dave Evans <dave.evans@nist.gov>, mike@haifire.com, harold.nelson@nist.gov

Shyam,

Attached is a set of questions we need answers for from PANYNJ regarding design, installation, operation and maintenance of the smoke management systems in WTC 1, 2 & 7. Answers to these questions are crucial to the work being performed by Hughes Associates, Inc. who are working on the Smoke Management system portion of the NIST WTC Investigation project.

Thanks,
Stuart

W. Stuart Dols
National Institute of Standards and Technology ==========

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Questions 1 -3 are from a memo received by NIST from Mike Ferreira of Hughes Associates, Inc. on February 6, 2004. Question 4 formulated by both NIST and Hughes during a meeting on the same date.

NOTE: PANYNJ responses are in red, italics, and underlined.

Hughes Associates, Inc. (HAI) is working toward completion of its report describing the smoke management systems in WTC 1 & 2 and their function on September 11, 2001. At this time, we have three remaining questions we would like to forward to the Port Authority pertaining to the operation of the smoke purge system. The questions result from conflicting information in the documentation provided by NIST. The questions are as follows:

1) WTC Instruction Manual No. 23, *Operation and Maintenance of Fire Protection System*, describes the smoke purge sequence as follows:

Interior Areas

a. Secure all fans in the pertinent MER.
b. Set all quadrant Normal/Purge/Reset switches to the Purge position.
c. Start all return air fans.
d. Start MER exhaust fan(s), if necessary.

Tower Core

a. Secure all fans in the pertinent MER
b. Set all quadrant Normal/Purge/Reset switches to the Purge position.
c. Start all return air fans.
d. Open Men's and Ladies' Room doors on the floors involved, and start the relevant toilet exhaust fan(s).

No mention is given in this sequence of starting the core supply fans. Several sources, including accounts of the 1975 fire in WTC 1, the 1993 Bombing, and the FEMA report on September 11, 2001 credit the buildings as having a "core pressurization system" and describe this sequence as supplying air to the core and exhausting the tenant spaces within an HVAC zone. Which sequence was understood by the building engineers to be the official "smoke purge" sequence?

1) During a fire/smoke incident, the fans stayed in operation until shutdown by a smoke detector on interlocking exhaust fans or at the direction of FDNY. FDNY would also direct what mode of operation the fans should be in. If fans were still operating, as often was the case, the engineer at FDNY direction would key over to purge mode. This would sequence spill dampers to open 100%. In addition, building operating procedure during a purge was to run the interior supply fans for purging effected quadrant. During purge, the interior fan's outside supply air dampers would go to 100% open. For example, during a smoke incident on 38NE in tower one, ACS 41-6 would be operating on purge outside damper open 100% ACR 41-4,5 or/& 6 would be operating on purge, spills open 100%. Core fans would not normally operate during a smoke purge unless conditions warranted and requested by FDNY.

The WTC Instruction Manual No. 23, Operation and Maintenance of Fire Protection System, has not been updated since the base building fire alarm system was upgraded after 1993.So, while they show the original systems, they do not always reflect the most current system like fire alarm or electrical substations which were upgraded post 1993.

2) Subsequent to the 1993 bombing, emergency power was provided for all emergency systems. One account of the bombing and subsequent changes made to the building, published in *Fire Engineering,* stated that emergency power was provided for all "smoke purge" fans. Given the number of fans used to accomplish smoke purge, in the various MERs, it would seem like a tremendous load to add these fans to the emergency power system. Was emergency power, in fact, provided for the building HVAC systems?

2) After 1993, emergency power was not provided to tower base building smoke purge fans. However, the MER's were equipped with redundant power sources from different substations.

3) The NYCBC required only the installation of fire dampers at duct penetrations into shafts. No requirement was found in Local Law #5 or any of the subsequent NY code changes to retrofit existing buildings with fire/smoke dampers. The Port Authority manual for new tenants mandates fire dampers but also describes how smoke dampers should be installed. Were there any electrically/pneumatically operated smoke dampers installed in HVAC ductwork for the base building systems used for smoke purge?

3) All the base building duct penetrations through rated partitions had fire dampers. There were no fire/smoke dampers in the base building HVAC system, except for ACS 108-5 in Tower One. This was done to accommodate the Windows on the World(WOW) build-out and HVAC upgrades. This would segregate WOW from tenant floors below. ACS-108-5 supplied the NW Quad of 106 along with base building floors below. During smoke purge, dampers at the MER would actuate to direct all the return air as outside exhaust and all the supply air fans to be on 100% outside air.

Please note that Local 94 engineers operated the system and they were contractor(ABM) employees, originally supervised by PA staff, and subsequent to the net lease, by John Griffin of Silverstein, who was killed on 9/11. Further information may be available from the Local 94 website http://www.local94.com/

4) We also need information related to a modification to Building 7.

It has been reported to NIST, that a modification was made to the fresh air supply to all floors occupied by Smith Barney. This modification installed duct fans to supply air from the top of the building to or using a vertical shaft in the building. This new supply was also used to provide air for stairwell pressurization and smoke purging.

We need to obtain any information that will provide a description of the

system, components, and operation. How does that system interact or replace the function of the original ventilation equipment in the building? What floors of building 7 were serviced by the new supply?

4) Since Silverstein properties operated and maintained this building since it was built, please contact them for any information on WTC 7.